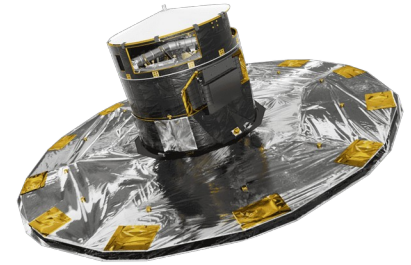
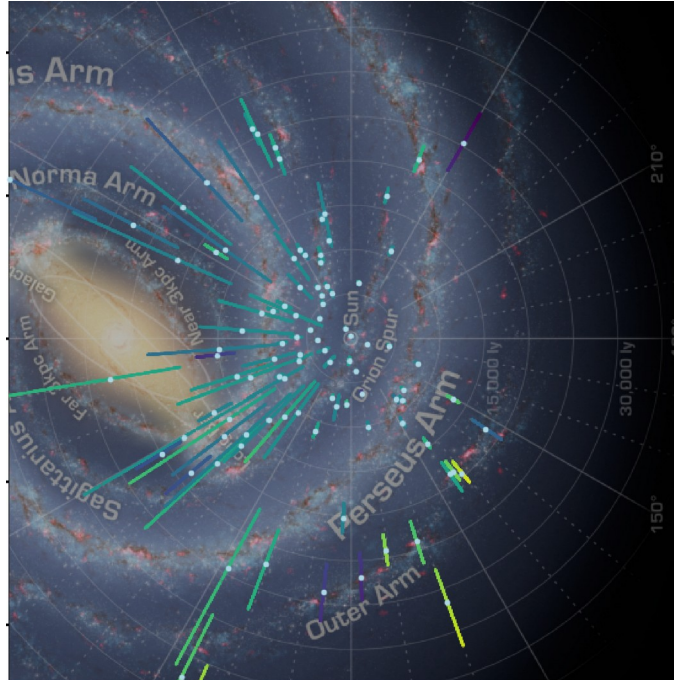
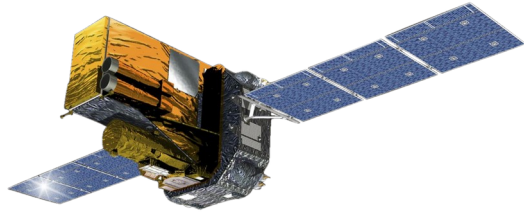


A catalogue of HMXBs in the Galaxy

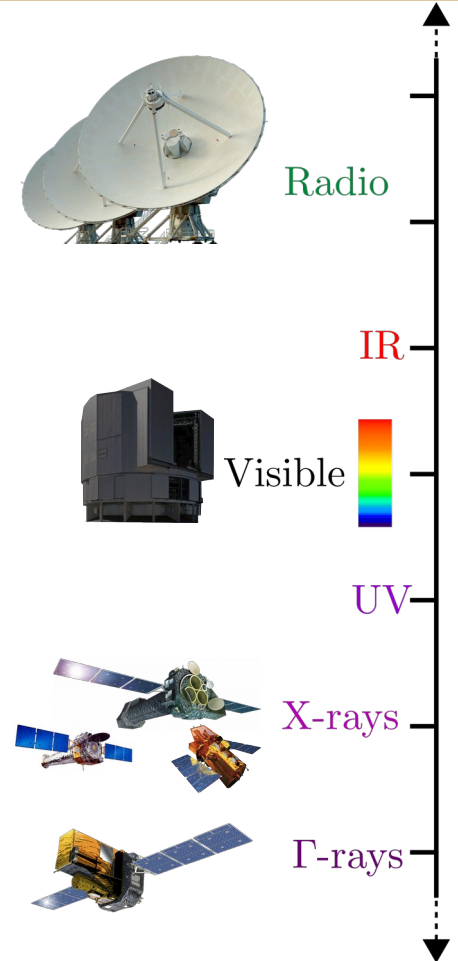


Francis Fortin – Postdoc LabEx UnivEarthS – APC

X-ray binaries: observational challenges

- 1) discovery in hard X-rays
- 2) better localization in soft X-rays
- 3) precise counterpart in optical/nIR/radio
 - spectral type of the companion star ?
 - (super)orbital period ?
 - spin period ?
 - radial velocity follow-up ?
 - variability ?

→ Many years & observations are necessary to fully constrain XRBs



Motivations for an updated catalogue of HMXBs

Latest dedicated catalogue of HMXBs : Liu et al. 2006 (n=114, 63 confirmed and 51 candidates)

- Since then, many campaigns for the follow up of INTEGRAL sources (n=939 in Bird+2016)

- + Abundance of soft X-ray observatories : Swift, XMM, Chandra, NuSTAR...

- HMXBs can have bright optical counterparts : Gaia can provide consistent distance estimates !

→ Catalogue : day-to-day work, planing new observations, studies on the scale of population

Building the catalogue

Catalogue = (Liu+2006 x INTEGRAL sources (2016) x CDS entries) + manual search

- Retrieve chain of counterparts from hard X-rays to nIR
- Depending on starting positional data, working up or down in the list to recover list of counterparts

→ 111 Gaia counterparts

- manual search in the literature:

Masses, Porb, e, Ppulse, RV

Catalogue	Reference	Radius
<i>HEAO 1</i>	Wood et al. (1984)	20'
<i>Uhuru 4</i>	Forman et al. (1978)	20'
<i>Ariel V 3</i>	Warwick et al. (1981)	20'
<i>INTEGRAL</i>	Bird et al. (2016)	20'
<i>Fermi</i>	Abdollahi et al. (2022)	20'
<i>BeppoSAX</i>	Capitanio et al. (2011)	6'
<i>Einstein 2E</i>	Harris et al. (1990)	4'
<i>ROSAT</i>	White et al. (2000)	35''
<i>Swift 2SXPS</i>	Evans et al. (2020)	8''
<i>4XMM DR11</i>	Webb et al. (2020)	4''
<i>Chandra CSC 2</i>	Chen et al. (2019)	3''
<i>2MASS</i>	Cutri et al. (2003)	120 mas
<i>Gaia DR3</i>	Gaia Collaboration (2022)	20 mas

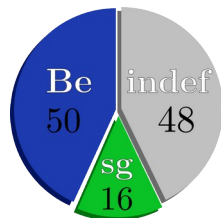
The new catalogue of HMXBs in the Galaxy

Last catalogue of HMXBs : [Liu et al. 2006](#) [114]

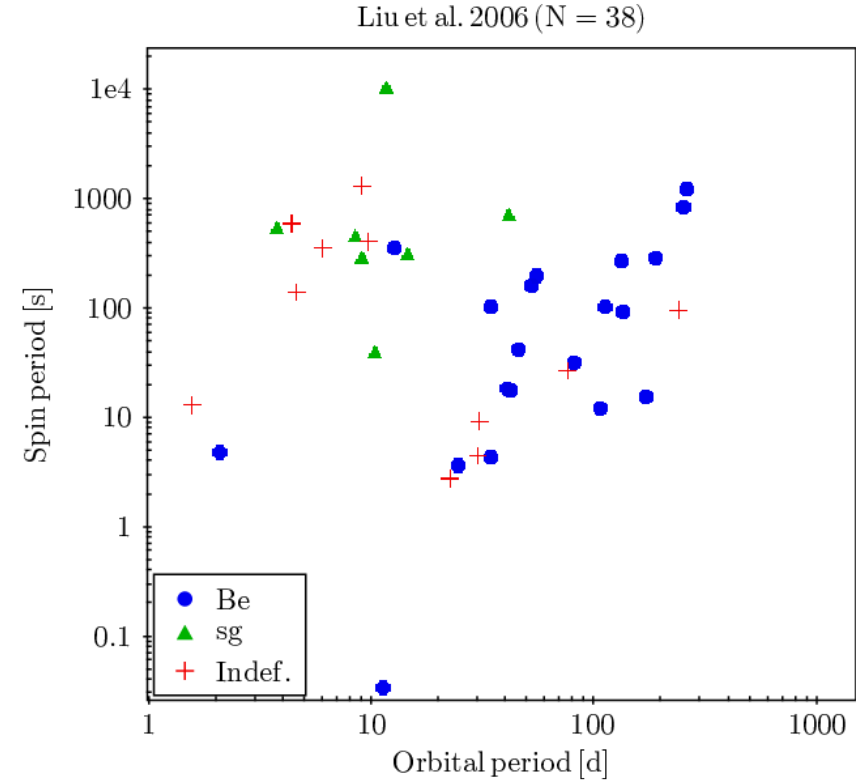
→ many new observations since then

→ INTEGRAL was just beginning !

Liu et al. (2006)



N=114



The new catalogue of HMXBs in the Galaxy

Last catalogue of HMXBs : [Liu et al. 2006](#) [114]

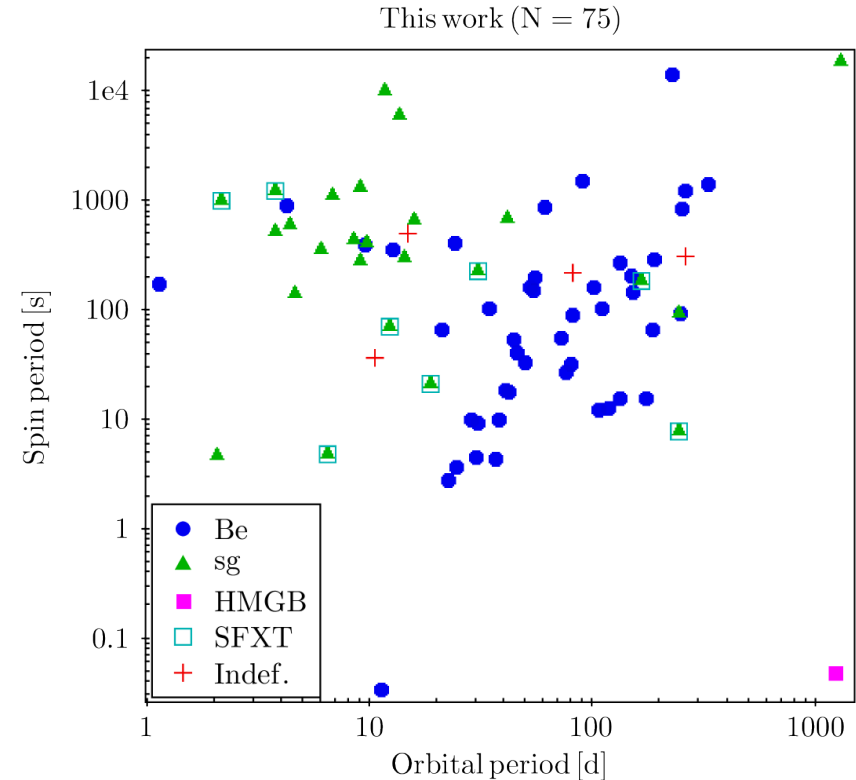
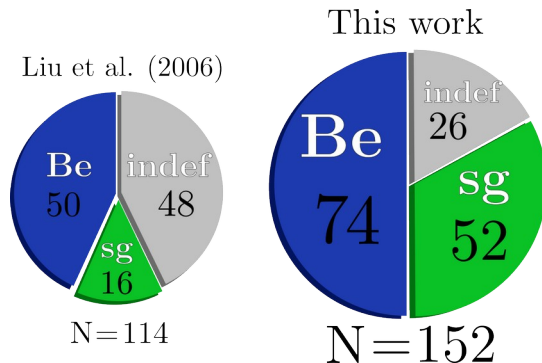
→ many new observations since then

→ INTEGRAL was just beginning !

New catalogue of HMXBs : [Fortin et al. 2023](#) [152]

→ automated search for multi-wavelength counterparts

→ manual search for spectral types, orbital parameters...



The observed HMXB population

If “confirmed” = X-ray + spectral type : $N = 126$

If “confirmed” += orbital period + spin : $N = 134$

Peculiar systems:

21 SFXT candidates Up to 7 BH HMXB candidates !

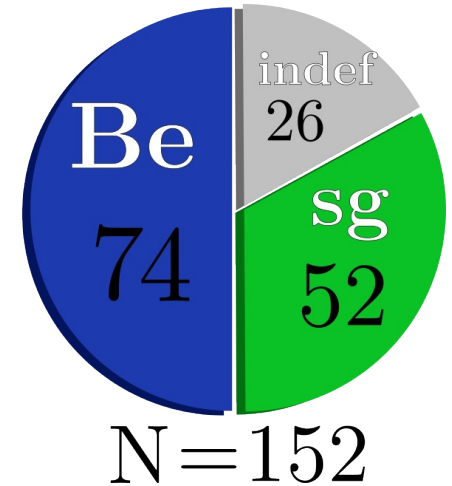
5 sgB[e] HMXBs

! Missing parameters !

26 spectral types 44 distances

41 orbital periods 115 radial velocities

96 eccentricities



HMXB Webcat : an online tool (live demo !)

A Catalogue of High-Mass X-ray Binaries in the Galaxy

From the *INTEGRAL* to the *Gaia* era

HOME CATALOGUE NOTES DOWNLOADS CONTRIBUTING ABOUT

Search HMXB:

Show: 10

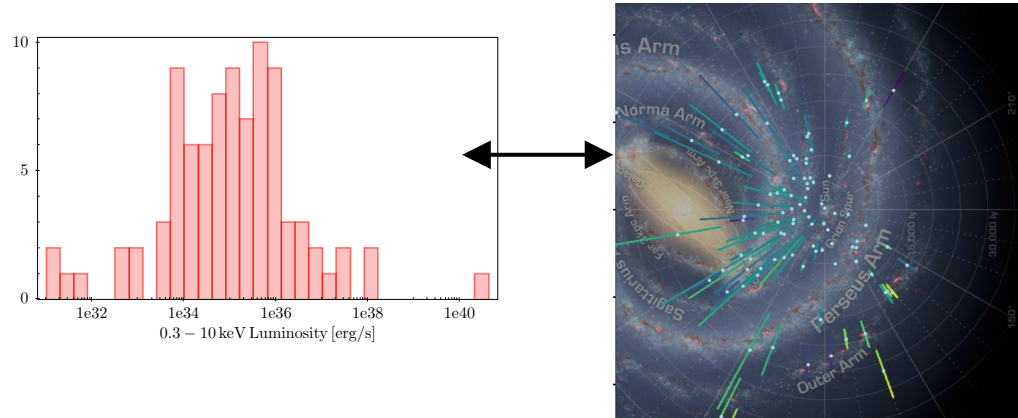
Query tip: any identifier known by Simbad will work !

<input type="checkbox"/>	Main ID [Field of View]	Spectral type	Class	Right Ascension [J2000]	Declination [J2000]	Error radius [mas]	Distance [pc]	Mx [Msun]	Mo [Msun]	Period [d]
<input type="checkbox"/>	IGR J00370+6122 [FoV]	BN0.7 Ib 2014A&A...566A.131G	sg	9.29013	61.3601	0.008	3401 (-171,+186)		22.0 2014A&A...563A...1G	15.664 2021P...
<input type="checkbox"/>	gam Cas [FoV]	B0.5IVpe 2011ARep...55...31S	Be	14.17745	60.7167	1.8			13.0 2000A&A...364L..85H	203.37 2012A...
<input type="checkbox"/>	EM* AS 14 [FoV]	B2 1960IzKry..24..160B		18.99604	59.1539	0.011	2592 (-140,+156)			

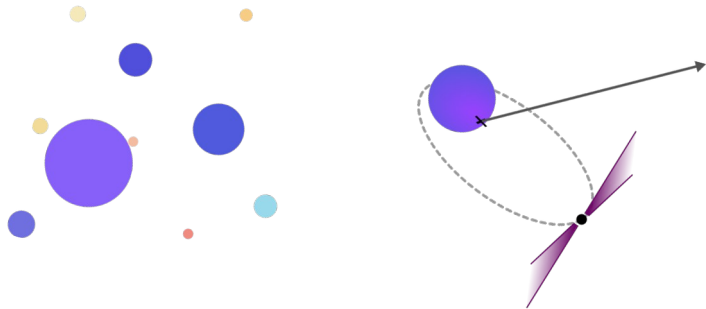
→ [GitHub/HMXBwebcat](https://github.com/HMXBwebcat)

What's the use ?

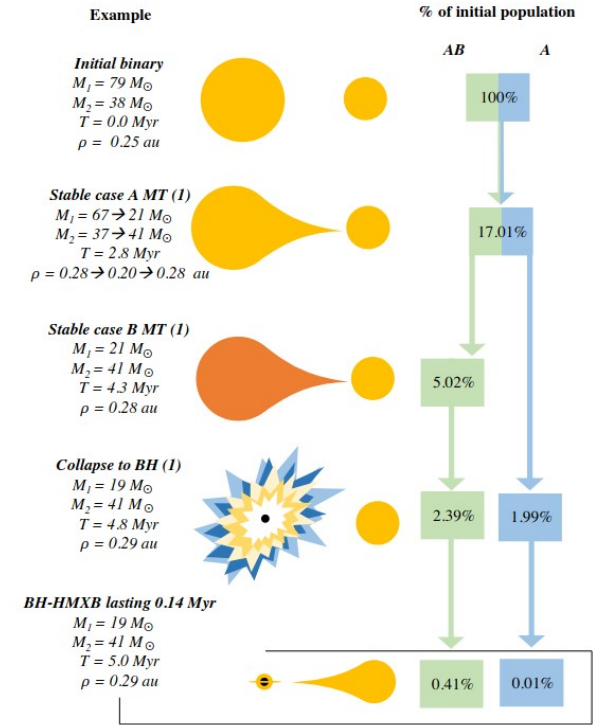
Contribution to X-ray luminosity



Evolution mechanisms



Population synthesis & compact binaries



Romero-Shaw+2023

Any contribution is welcome !

Visit the GitHub repo or reach me via email.

Modifications will be logged on the website
& new version will be available for download.

Thanks !

Attendance reward:



Long-tailed tit

Étangs de Marcoussis, FR